Predicting Presence of Pneumonia from Images of X-Rays

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Outline

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Business Problem

- Stakeholder: angel investor for startup
- Predict presence of pneumonia from x-rays

Comply with FDA standards

Seek Funding

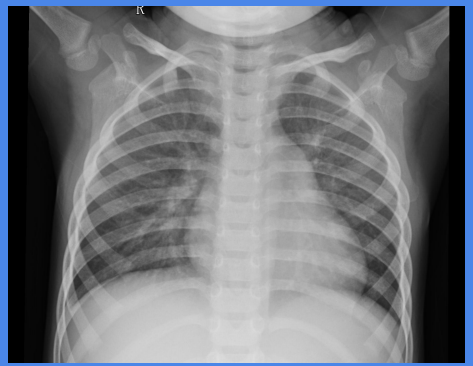
Create Software Diagnostic Tool

Partner with Medical Practitioners

Data

- 5,800 x-rays
- Bacterial and viral pneumonia

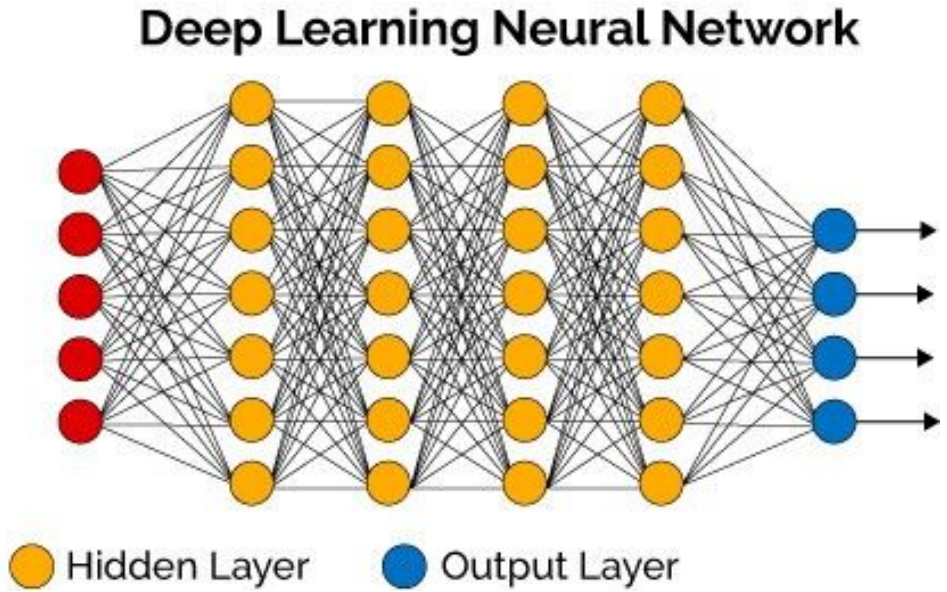
Normal: 4273 images



Pneumonia: 1583 images

Methods

- Deep Learning
- Convolutional Neural Networks



Model Results

- Common x-ray performance metrics:
  - Sensitivity, specificity, PPV, F1

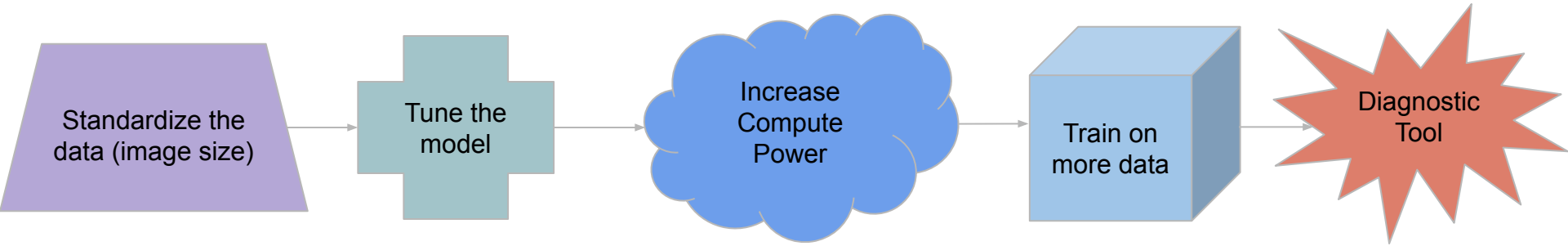
Metric Type	Goal Value*	Baseline Value	Final Model Value
Sensitivity	0.720	0.959	0.877
Specificity	0.973	0.632	0.939
PPV	0.682	0.813	0.970
F1	0.435	0.880	0.920

Legend:
- <10% worse than standard
- >=10% worse than standard
- >=10% better than standard

* Reference Appendix

Conclusions & Further Recommendations

Improve the Model and Create the Product



Appendix

Evaluation standard sources:

- IBM - radiology resident success metrics include sensitivity, specificity, and positive predictive value:
  - https://www.ibm.com/blogs/research/2020/11/ai-x-rays-for-radiologists/
- Stanford University - Andrew Ng and others cite F1 score as their evaluation metric used in their CheXNet algorithm
  - https://arxiv.org/pdf/1711.05225.pdf

Dataset Source:

- https://www.kaggle.com/datasets/paultimothymooney/chest-xray-pneumonia